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~~LASSEN~~ Timber Management ~~Lassen~~ April 26, 1926
Eastern Lassen Working Circle

PREDICTION OF THE SECOND CUT

LASSEN LUMBER & BOX COMPANY SALE
11-16-17

By

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Forest Examiner

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PREDICTION OF THE SECOND CUT

LASSEN LUMBER & BOX CO. SALE 11/16/17

INTRODUCTION

The prediction of the second cut on the Lassen Lumber and Box Company sale 11/16/17, was undertaken primarily for the purpose of answering the question - "When can a merchantable second cut be expected under the present method of cutting?"

Such a prediction is important because of the extensive cutting in progress, some 1500 acres annually since 1918, and because this sale area presents a site and type typical of the major portion of the Eastern Lassen Working Circle which has been placed under management on a sustained yield basis.

THE SITE

The sale area supports a pure yellow pine stand open in character, averaging about 17 M feet B. M. per acre, approximately 85% of which is marked for cutting. The topography consists of a generally level lava plateau ranging in elevation from 5500 to 6000 feet. Variations in soil depth throughout the area result in a considerable spread of mature heights. On the shallower soils the mature heights indicate the upper limits of site IV. On the deeper soils site III is indicated. It is obviously impracticable to segregate such small and intermingled areas of site III and IV so the average site was considered to be that indicated by 67 mature heights cross-sectioning the area. These heights averaged 130 feet thus indicating a low site III.

METHOD OF PREDICTION

The customary method of utilizing growth data secured on comparable old cuttings could not be employed because of the absence of such cuttings. It was evident that any satisfactory prediction must give a measure of (1) the growth that takes place with different degrees of cutting, and (2) the natural thinning loss in numbers. The method used is an attempt to give proper weight to these primary factors affecting the yield of a stand. It is based on two assumptions, (1) that ~~the rate of growth~~

of trees in the reserved stand which maintain positions of isolation, dominance, and codominance during a cutting cycle will grow at the same rate as similar trees which have maintained these respective crown class positions in the uncut stand, and (2) that the intermediate and suppressed trees not included in the calculations will fully take care of the loss in numbers due to natural thinning.

Except for an additional class, isolated trees, the crown class, differentiation is in accordance with the recognized standard crown classification. By isolated trees is meant dominant trees comparatively free from root competition. In the field a tree was classified as isolated when it had no competition aside from reproduction within a radius of 30 feet and from not more than one tree within a radius of 50 feet.

FIELD WORK

The field work involved two distinct steps:

(1) A ten per cent cruise of timber sale cuttings in which all trees 4 inches and over in D.B.H. were tallied separately by 2-inch diameter classes, 16 foot log classes to an 8-inch top, and by predicted crown classes for a 70 year cutting cycle.

(2) The selection, in uncut stands of similar site and type, of trees in each of the three upper crown classes from which increment cores were taken at breast height together with measurements of diameter, height, bark thickness, and length of crown.

1. CRUISE OF TIMBER SALE CUTTING.

In the cruise the predicted crown positions of the individual trees at the end of a 70 year cutting cycle is not of course a strictly accurate classification. However, anyone familiar with tree growth can judge with sufficient accuracy for present purposes the ultimate crown positions from the present location of the trees in the stand. In making this segregation trees injured or diseased to the extent that no increment could be expected were omitted. A 70 year period was used as a basis for segregation since this is the cutting cycle used in the management plan for the Eastern Lassen Working Circle.

2. INCREMENT CORES.

With the exception of codominants, the trees selected for cores were of the same general character as those left in marking on the sale area, that is, they were healthy trees with good crowns. Merchantable codominants seldom appear in cuttings which have been properly marked.

The cores included 5 to 7 inches of radius inside bark for all trees sufficiently large in diameter. As soon as removed the inches of radius were marked off and all data such as crown class, D.B.H., total height, bark thickness, etc., were recorded with an indelible pencil on the cores which were preserved for later analysis. Bark thickness was determined at the point the core was taken and on the side of the tree directly opposite by driving a graduated blunt screw driver through the bark. The recorded bark thickness was the average of these two measurements. Diameters were taken with a diameter tape and heights with a hypsometer at a measured distance of 100 feet from the tree.

OFFICE WORK

A stand and stock table given as a part of table 4 was compiled from summaries by sections of the data secured in the ten per cent strip cruises. The standard Site III table for yellow pine was the basis for volume.

The curves and tables presented here were constructed from the increment core ring counts and measurements taken on the trees from which the cores were taken.

As would be expected the height curves show, for a given diameter, that isolated trees are the shortest and codominant trees the tallest. Because of this segregation by probable future dominance classes it is believed that the substitution of these height-diameter curves for height growth curves can safely be made.

The first step in the construction of the D.B.H. age Interval Curves was to determine the average number of rings in the last inch for each 2-inch diameter class (inside bark). The possibility of including data not applicable to the crown class concerned was eliminated in securing these averages by the omission of ring counts of all inches of radius covering the period prior to any release shown by the core. The next step involved the plotting and curving of these averages on the corresponding diameter outside bark using the bark correction given by the bark thickness curve. These age interval curves are the basis for the diameter growth prediction curves.

The volume growth prediction tables were constructed from the diameter growth prediction curves and D.B.H. height curves using the District 5 Site III yellow pine table based on total heights. The prediction for the trees in the merchantable diameter classes is expressed in per cent of present volume because of the ease of application to the stock table.

APPLICATION OF VOLUME PREDICTION TABLES.

In table No. 4 the volume prediction tables are applied to a stand and stock table for the average acre in section 32, T. 30 N., R. 9 E. Eventually similar tables will be prepared for each section on the sale area, since cruises are made currently as cutting is completed on section units. However, section 32 is typical of the sale cuttings and suffices to illustrate the method of prediction.

In this prediction no allowance has been made for accidental losses from wind, insects, lightning, etc., in the three upper crown classes. Preliminary observations made in connection with the cruises indicate such losses to be exceedingly low. For this reason it is believed that the yield from intermediate and suppressed trees together with the additional growth on trees stepped up in crown class by the accidental removal or death of neighboring dominant and codominant trees will more than compensate for such losses.

APPLICATION OF METHOD OF PREDICTION WHERE CUTTINGS ARE NOT AVAILABLE

This method of prediction can also be employed for predicting the second cut in the preparation of management plans for working circles where cuttings are not available. The procedure would be about as follows:

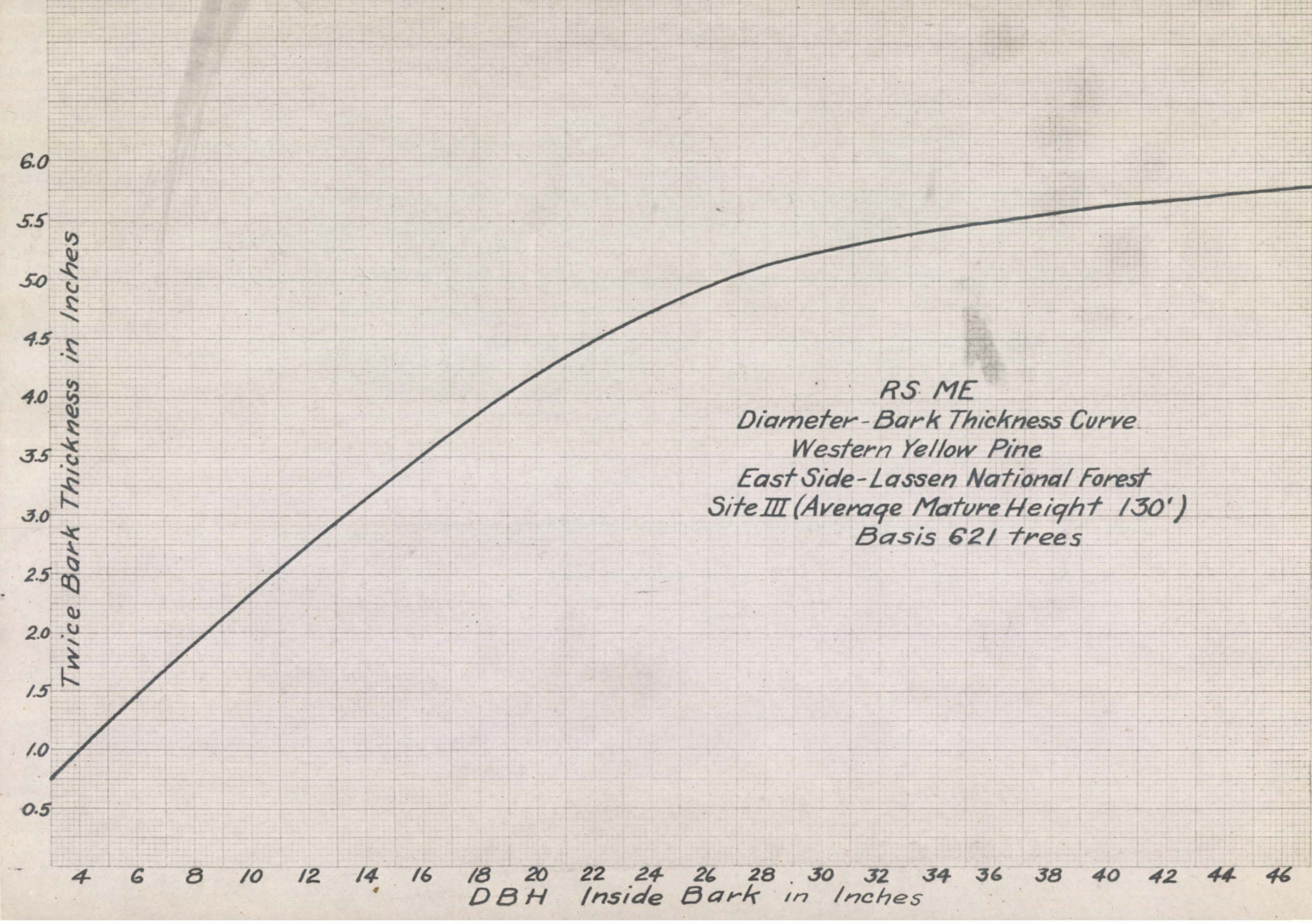
(1) Division of working circle into general sites.

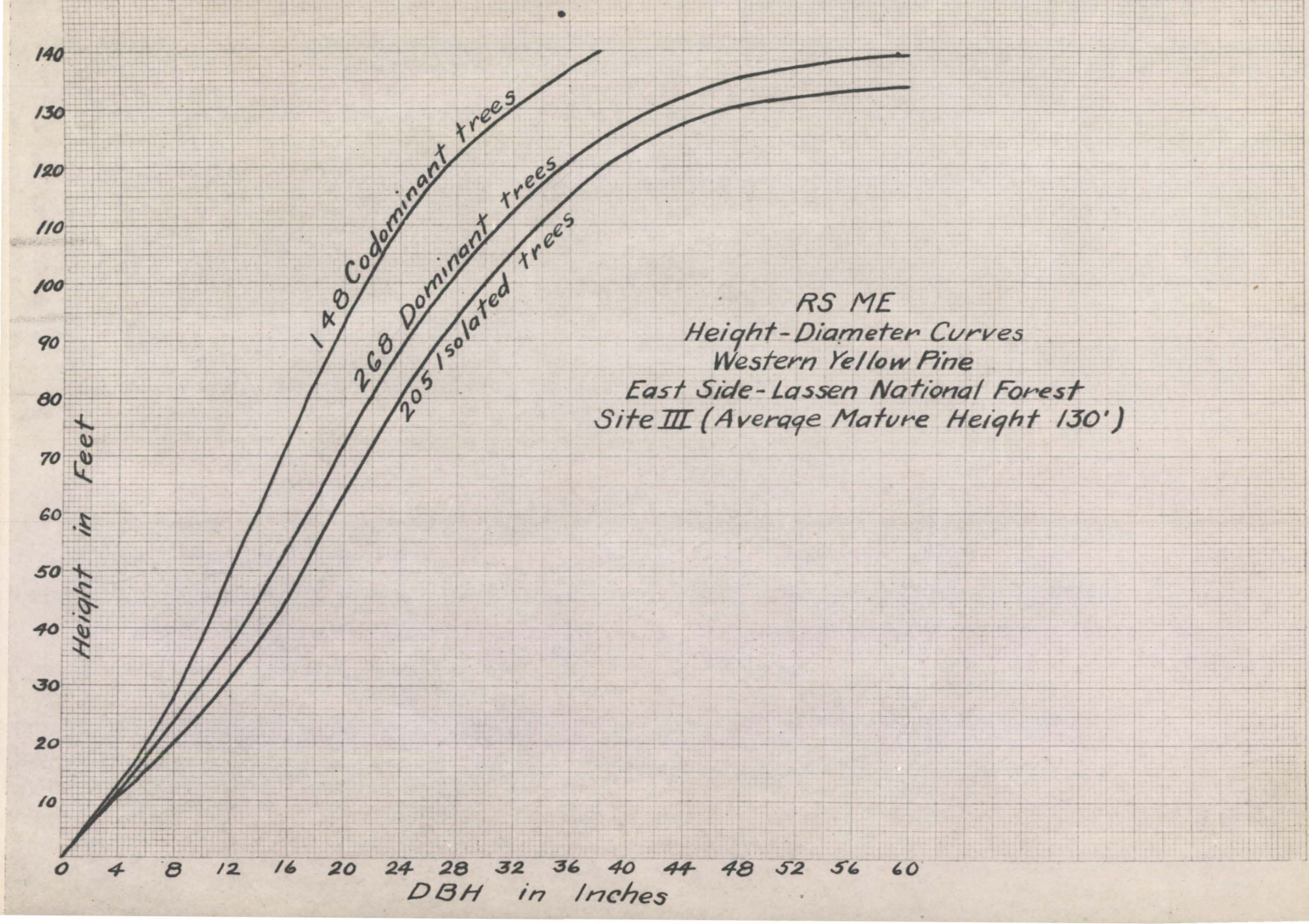
(2) Preparation of stand and stock tables for each species and site class from strip cruises segregating the trees to be left into predicted crown classes resulting from the removal of the marked trees.

(3) Reduction of stand and stock tables for each site by properly weighted allowances for trees lost in logging based on damage studies for each of the logging methods to be employed. Further reductions for accidental losses from wind, insects, etc., based on the best available information.

(4) Preparation of volume prediction table for each species and site class from increment cores, preferably taken within the area concerned.

(5) Application of the volume prediction tables to the reduced stand and stock tables.


RS ME
Diameter - Bark Thickness Curve
Western Yellow Pine
East Side - Lassen National Forest
Site III (Average Mature Height 130')
Basis 621 trees
Twice Bark Thickness in Inches
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46
DBH Inside Bark in Inches


140
130
120
110
100
90
80
70
60
50
40
30
20
10
Height in Feet
0 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60
DBH in Inches
148 Codominant trees
268 Dominant trees
205 Isolated trees
RS ME
Height-Diameter Curves
Western Yellow Pine
East Side-Lassen National Forest
Site III (Average Mature Height 130')

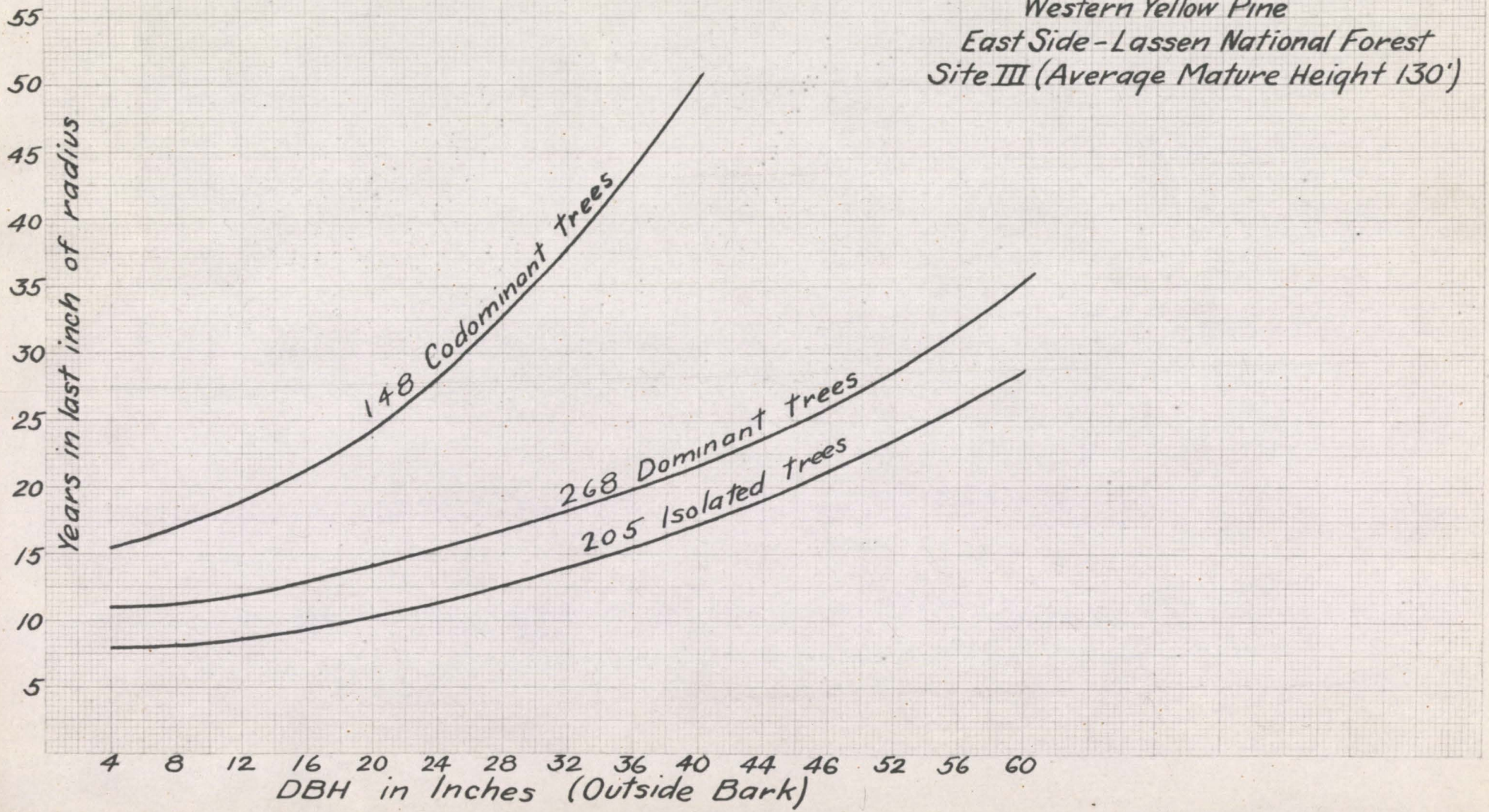
RS ME

DBH - Age Interval Curves

Western Yellow Pine

East Side - Lassen National Forest

Site III (Average Mature Height 130')



RS ME

Diameter Growth Prediction Curves

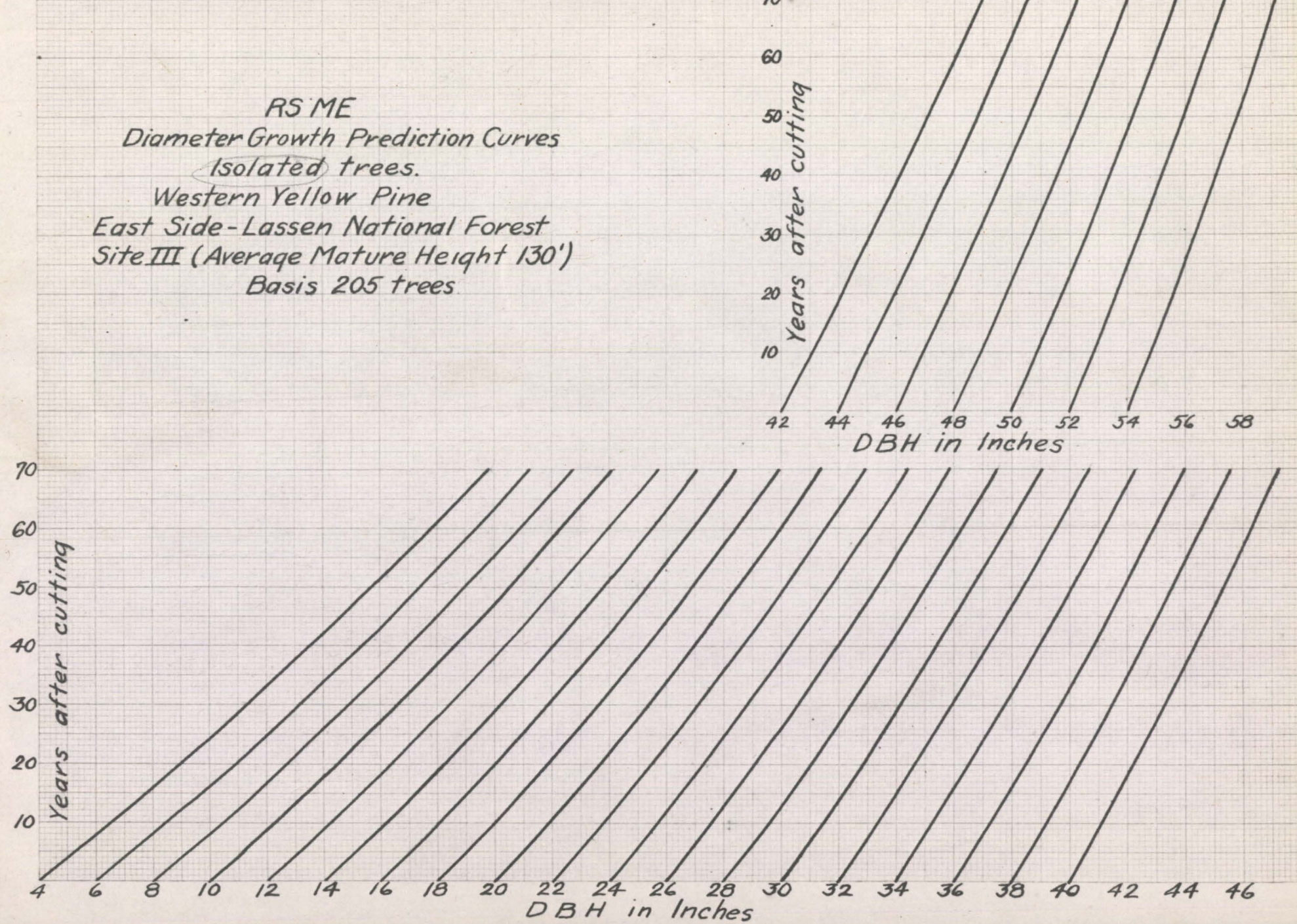
Isolated trees.

Western Yellow Pine

East Side - Lassen National Forest

Site III (Average Mature Height 130')

Basis 205 trees



RS ME

Diameter Growth Prediction Curves

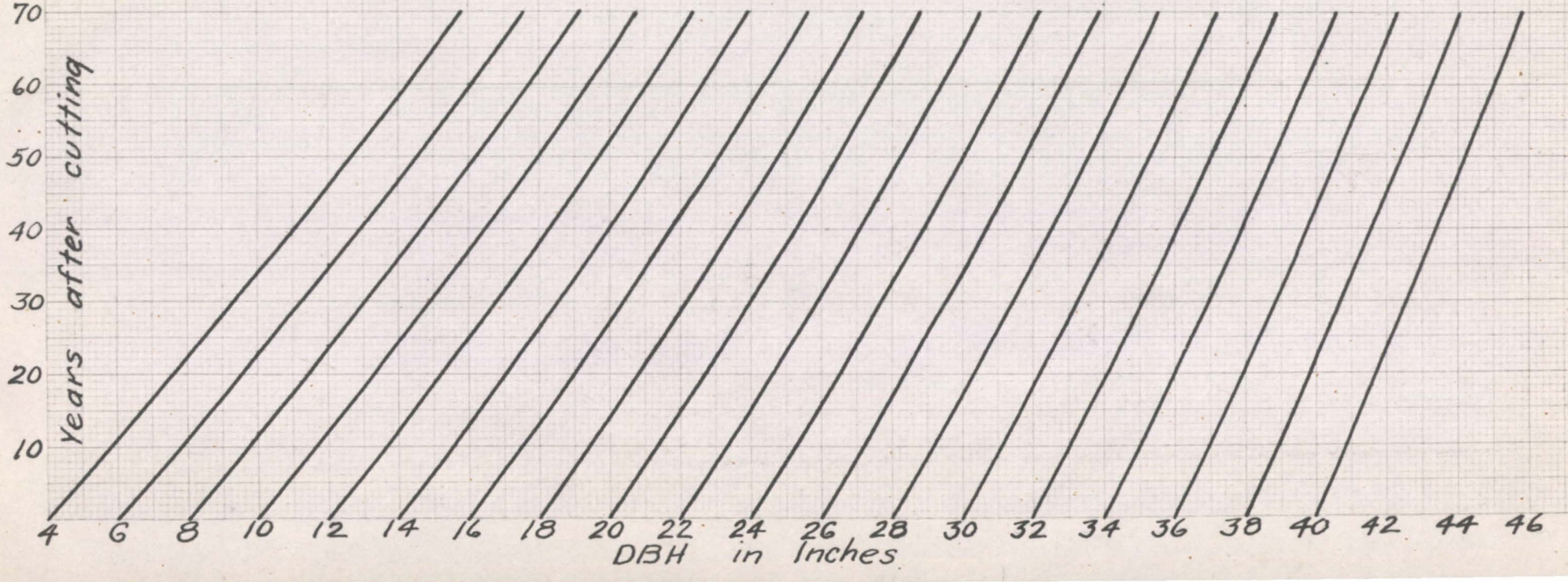
Dominant trees

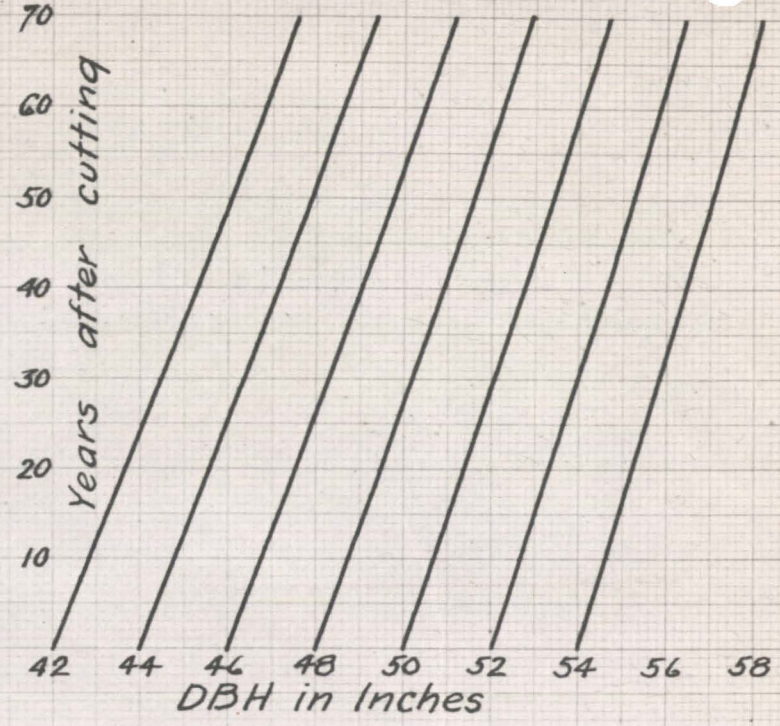
Western Yellow Pine

East Side - Lassen National Forest

Site III (Average Mature Height 130')

Basis 268 trees





RS ME

Diameter Growth Prediction Curves

Codominant trees

Western Yellow Pine

East Side - Lassen National Forest

Site III (Average Mature Height 130')

Basis 148 trees.

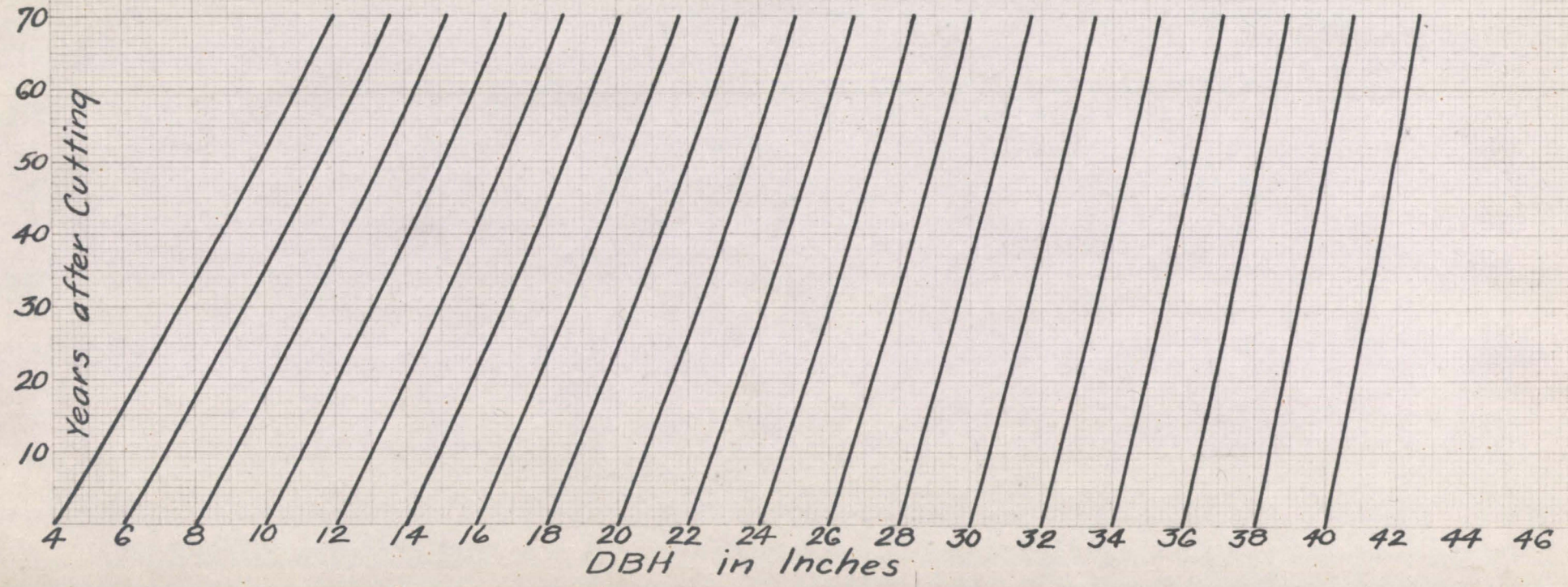


TABLE NO. 1 VOLUME GROWTH PREDICTION

WESTERN YELLOW PINE - ISOLATED TREES SITE III

Present D.B.H.	Years after cutting: 10	20	30	40	50	60	70	Unit
4				40	80	160	260	Volume per tree in Bd. Ft. B.M.
6			40	70	140	240	360	
8		30	60	120	220	280	470	
10	30	50	100	200	320	440	580	
12	167	333	633	1000	1466	1866	2333	
14	180	360	580	840	1100	1400	1760	
16	177	311	444	600	755	977	1177	
18	165	233	318	400	512	611	771	
20	143	196	239	303	382	467	557	
22	134	168	214	268	324	388	444	
24	124	158	198	239	282	323	365	
26	124	153	184	220	248	278	312	
28	121	146	171	195	218	243	267	
30	119	137	154	174	192	213	231	
32	113	128	142	158	172	186	210	
34	112	124	136	149	161	174	187	
36	111	121	130	142	153	163	173	
38	108	117	126	136	145	153	162	
40	108	116	124	131	139	147	154	
42	107	113	120	127	133	140	146	
44	106	112	118	123	129	135	140	
46	105	110	115	120	125	130	135	
48	104	109	114	119				
50								

Volume in percent of present volume.

TABLE NO. 2 VOLUME GROWTH PREDICTION

WESTERN YELLOW PINE - DOMINANT TREES SITE III

Present D.B.H.	Years after cutting: 10	20	30	40	50	60	70	Unit
4				30	60	90	130	Volume per tree in Bd. Ft. B.M.
6				60	100	140	210	
8			60	100	150	220	290	
10		70	110	160	230	300	400	
12	160	220	340	500	640	820	1020	
14	122	211	289	378	489	589	722	
16	150	207	258	329	400	493	579	
18	135	169	213	261	313	370	448	
20	126	156	191	226	270	321	376	
22	123	148	175	208	246	288	323	
24	120	143	168	197	222	256	286	
26	119	140	164	184	209	233	258	
28	115	132	148	167	185	202	219	
30	113	127	140	155	168	181	192	
32	111	126	134	144	153	163	175	
34	109	117	125	133	143	154	162	
36	107	113	122	132	139	146	154	
38	107	115	122	129	136	142	149	
40	105	111	117	122	129	135	142	
42	105	111	115	121	126	131	136	
44	105	109	114	119	123	128	132	
46	104	108	112	116	120			
48	103	107						
50								

Volume in percent of present volume.

TABLE NO. 3 VOLUME GROWTH PREDICTION

WESTERN YELLOW PINE - CODOMINANT TREES SITE III

Present D.B.H.	Years after cutting 10	20	30	40	50	60	70	Unit
4							90	Volume per tree in Bd. Ft. B. M.
6						110	140	
8				100	110	160	200	
10		100	110	150	190	240	290	
12	133	167	211	266	312	378	445	Volume in percent of present volume.
14	127	153	186	226	267	300	340	
16	121	142	171	192	217	250	279	
18	113	129	148	167	189	211	230	
20	112	125	143	157	170	186	200	
22	110	119	133	143	154	166	179	
24	108	117	126	139	146	158	169	
26	107	116	125	134	143	152	162	
28	106	114	120	128	135	142	150	
30	106	110	115	121	126	132	138	
32	104	109	114	119	123	128	132	
34	103	107	111	115	118	121	124	
36	102	105	108	110	113	115	118	

TABLE NO. 4 PREDICTION OF SECOND CUT FOR SECTION 32, T. 30 N., R. 9 E.
AVERAGE ACRE AT END OF 70 YEARS.

WESTERN YELLOW PINE PURE YELLOW PINE TYPE SITE III

D.B.H. 1925	STAND AND STOCK TABLE° 1925								PREDICTED GROWTH°° 1995						STOCK TABLE 1995			
	ISOLATED		DOMINANT		CODOMINANT		TOTAL		ISOLATED		DOMINANT		CODOMINANT		ISOLATED	DOMINANT	CODOMINANT	TOTAL
	No.	Bd.Ft.	No.	Bd.Ft.	No.	Bd.Ft.	No.	Bd.Ft.	Bd.Ft.	%	Bd.Ft.	%	Bd.Ft.	%	Bd. Ft.	Bd. Ft.	Bd. Ft.	Bd. Ft.
4	.20		2.58		.72		3.30		260		130		90		52	335	65	452
6	.22		1.70		.47		2.39		360		210		140		79	357	66	502
8	.34		1.11		.25		1.70		470		290		200		160	322	50	532
10	.11		.55		.19		.85		580		400		290		64	220	55	339
12	.12	3	.70	18	.06	1	.88	22		2333		1020		445	70	184	4	258
14	.08	3	.50	23	.12	5	.70	31		1760		722		340	53	166	17	236
16	.12	10	.59	41	.12	12	.83	63		1177		579		279	118	237	33	388
18	.12	18	.56	65	..11	17	.79	100		771		448		230	139	291	39	469
20	.16	30	.37	81	.05	13	.58	124		557		376		200	167	305	26	498
22	.16	50	.30	160	.02	7	.48	217		444		323		179	222	517	13	752
24	.19	98	.35	165	.06	33	.60	296		365		286		169	358	472	56	886
26	.14	90	.30	196			.44	286		312		258			281	506		787
28	.19	142	.20	178			.39	320		267		219			379	390		769
30	.05	70	.22	253			.27	323		231		192			162	486		648
32	.12	188	.06	88			.18	276		210		175			395	154		549
34	.10	176	.02	31			.12	207		187		162			329	50		379
36	.03	71	.02	35			.05	106		173		154			123	54		177
38	.02	39					.02	39		162					63			63
40	.02	53					.02	53		154					82			82
42	.02	38					.02	38		146					55			55
	2.51	1079	10.13	1334	2.17	88	14.61	2501							3351	5046	424	8821

° Based on 10% strip cruise Section 32.
°° From Tables 1, 2, & 3. Bd. Ft. = Volume per tree. % = Volume in % of present volume.